

UTILITY APPLICATION

OF

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FOR

UNITED STATES PATENT

ON

**FLEXIBLE MAGNETIC PAD WITH MULTI-
DIRECTIONAL CONSTANTLY
ALTERNATING POLARITY ZONES**

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Cross-References to Related Applications

This patent application is a continuation-in-part of United States Patent Application
15 Serial Number 09/855,815 filed May 14, 2001 which is a continuation-in-part to United States Patent Application Serial Number 09/212,737 filed December 15, 1998, now U.S. Patent No. 6,328,684, which is a continuation of Application Serial No. 08/678,348 filed July 11, 1996, now U.S. Patent No. 5,871,438, which is a continuation-in-part of Application Serial No. 08/573,390 filed December 15, 1995, now U.S. Patent No. 5,538,495, which is a continuation
20 of Application Serial No. 08/427,733 filed April 24, 1995, now U.S. Patent No. 5,514,072, which is a continuation of Application Serial No. 08/276,876 filed July 18, 1994, now abandoned, which is a continuation of Application Serial No. 08/158,607 filed November 29, 1993, now abandoned, which is a continuation of Application Serial No. 07/990,927 filed December 14, 1992, now U.S. Patent No. 5,277,692, which is a continuation of Application

Serial No. 07/823,149 filed January 21, 1992, now abandoned, all of which are incorporated herein by this reference thereto.

BACKGROUND OF THE INVENTION

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Field of the Invention

A flexible magnetic pad is provided with constantly alternating polarity zones which therapeutically affects blood vessels to increase blood flow, irrespective of the orientation of the blood vessels with respect to the pad. In the preferred embodiment, the polarity zones are
10 tightly wound in alternating poles arranged in a spiral configuration throughout the pad.

Description of the Related Art

Various attempts have been made to provide therapeutic pads with magnetic alternating polarities to increase blood flow, and therefore accelerate healing of injured body parts. The
15 technology is based on principles of electricity and magnetism set forth in Faraday's Law of Magnetic Induction and the Hall Effect. Basically, these principles establish the fact that charged particles experience a force acting upon them when they move through a magnetic field in a perpendicular direction. Since human blood is replete with ions and electrolytes, it is an ideal carrier of charged particles. A blood vessel exposed to a proper alignment of
20 alternating magnetic fields could experience an induced voltage of sufficient strength to produce a mild alternating current which could generate enough heat to cause a widening of the blood vessel and thus an increase in blood flow.

In U.S. Patent No. 4,489,711 of Latzke, alternating stripes of north and south magnetic poles are unidirectional in pole orientation. Latzke '711 provides parallel stripe-shaped poles in a linear arrangement that do not exhibit therapeutic effects on blood vessels that are not extending substantially transversely thereto.

5 In U.S. Patent No. 4,549,532 of Baermann, either concentric rings or radial sectors with alternating polarities are provided. However, with respect to the concentric ring configuration of Baermann '532, the effective orientation for the concentric ring design is limited because of the assumption that all blood vessels will cross through the center of the device. The Baermann '532 device becomes progressively less effective as blood vessels are
10 positioned away from the center until the device is non-effective at its peripheral outer ring, where a blood vessel will only transverse one pole with no increase in blood flow. The reverse is true for the radial sector configuration of Baermann '532 where the device's effectiveness decreases as blood vessels are positioned away from the periphery and toward the center. The Baermann '532 patent states that the concentric ring device, which is his preferred
15 embodiment, can be universally oriented on a body site. However, the Baermann '532 "body site" is limited to an area where blood vessels traverse across the center of the device and therefore the therapeutic effects of the magnetic pad on the blood vessels covered by the area of the pad is diminished because of the necessity for all blood vessels to traverse the center.

The advantage of the placement of the present invention is that it takes into account all
20 random positions of the blood vessels relative to the location of the device. The present invention maximizes the effective area underneath the pad. It works as well for a blood vessel traversing near the periphery as it does for a blood vessel traversing the center of the pad.

The device of the present invention is made from a ferrite material which is magnetized and impregnated within a rubbery synthetic material. With the present invention, more varied orientations of alternating polarities of magnetic poles with respect to the body site blood vessels are accomplished in a spiral orientation, which insures that blood vessels must cross
5 alternating poles at any angle or position across the therapeutic pad.

In the present invention, the poles of the same polarity are in staggered positions, which means that no two poles of the same polarity are adjacent to each other. The present invention insures that blood vessels crossing a pole of one polarity will cross another pole of opposite polarity without exceeding the effective therapeutic distance between poles of 4 to 10 mm, as
10 claimed in the Latzke '711 patent. Specifically, Latzke '711 states at column 3, lines 9-13, that magnetic sheets having alternating positive and negative poles in strips 2 mm apart, are too close for therapeutic purposes. Latzke '711 further states at column 3, lines 13-18, that strips of alternating polarity 5 mm apart are especially satisfactory.

A study by Mr. Ted Zablotzky of October, 1989 entitled "The Activation of Permanent
15 Magnets in Musculoskeletal Injuries" in updated commercial literature entitled "The Science of Biomagnetics," discusses the Baermann '532 patent and alleges on page 19, lines 2 and 3 that "every blood vessel" except for those perpendicular to the skin, will cross a series of north and south poles. Zablotzky illustrates his theory with a drawing Figure 3 on page 19 thereof, which shows three ideal blood vessel positions across the Baermann '532 device, where the
20 vessel is located close to or at the center of the pad. In reality, however, this ideal arrangement of blood vessels cannot be expected.

In short, the Baermann '532 device has no poles which alternate circumferentially, except for an alternate embodiment with "pie piece" shaped sectors adjacent to each other in a

radial arrangement. However, this alternate embodiment of the Baermann '532 device is only effective near the peripheral areas of the device, since a blood vessel traversing at or near the center of the pad will substantially pass only through one polarity, crossing the pad from "north to north" or "south to south" only.

5 As mentioned, the aforesaid Latzke '711 patent claims an effective therapeutic range in pole width of each pole of 4 to 10 mm. Therefore, the Baermann '532 device cannot overcome the limitations of the concentric ring design by adding more rings in a more densely packed arrangement since decreasing the width of the rings to less than 4 mm would be of no therapeutic value. Therefore, the Baermann '532 device is limited in the number of rings used
10 in the device since the width of the rings must decrease as the number of rings increases.

To summarize, in the Baermann '532 device having concentric ring versions shown in Figures 1, 3 and 4 in the Baermann '532 patent (and illustrated herein as drawing Figures 5 and 6), the Baermann '532 magnetic impregnated pad has a decreasing effect as the orientation of the blood vessels leaves the center of the pad and approaches the periphery of the pad where
15 it will not be exposed to alternating polarities.

Likewise, in the Baermann '532 pie sector version shown in Figure 2 (and illustrated in drawing Figures 7 and 8 herein), the pad therein will have decreasing effect on blood vessel flow as the orientation of the blood vessel leaves the periphery and approaches the center where it will not be exposed to alternating polarities.

20 Similarly for UK patent application GB 2196855 of Kitagishi et al. (Kitagishi), limitations exist as to the alternation of magnetic polarity that is seen as provided a degree of magnetotherapeutic ability as the Kitagishi device enjoys only a limited degree of magnetic

polarity alternation. This is due, in part, to the ready assembly and disassembly of the Kitagishi device, an important characteristic of it.

SUMMARY OF THE INVENTION

5 The device of the present invention utilizes principles set forth in the Latzke '711 patent. In the present invention, magnetic poles are arranged in an alternating pattern of north (—) and south (+) polarity zones or poles. When placed over an afflicted area of the human body, these polarity zones have been shown to have a therapeutic effect. For example, the pad can be applied to musculo-skeletal bruises, sore muscles and joint pain for relief to the user
10 from such pain. These polarity zones, however, must be positioned in such a way as to cause blood moving through the veins in the body to pass through the magnetic fields established by the polarity zones in an alternating field pattern. This would easily be accomplished if all the blood vessels in the body were situated in the same direction. It is obvious, however, that this is not the case. The Latzke '711 device calls for the magnetic poles to be arranged in a
15 parallel-striped configuration, as noted in Figure 1 of Latzke '711 (as illustrated in Figures 3 and 4 herein). Therefore, its effectiveness is limited only to those blood vessels which cross the parallel boundaries of adjacent poles in a perpendicular or nearly perpendicular manner (as noted in Figure 4 herein of the present invention).

 In an attempt to overcome this limitation, the Baermann '532 patent proposed that the
20 alternating magnetic poles be arranged in a concentric ring configuration as noted in Baermann '532 Figure 3 therein. At first glance, it would appear that this configuration of the Baermann '532 patent should be effective on blood vessels in any orientation in the body. However, upon closer examination it becomes clear that the Baermann '532 configuration is effective

only on those blood vessels which cross at or near the center of the pole configuration (as noted in Figure 6 herein). Although the Baermann '532 configuration affects more blood vessels than the Latzke '711 configuration and therefore represents an improvement over the Latzke device, it does not offer the optimum configuration to deal with all possible vessel
5 orientations in the body with respect to the device.

To overcome the limitation of the previous patents described above, the present invention provides a new configuration which does in fact affect blood vessels in any orientation in the body under which the device is placed. This present invention includes a pattern of constantly alternating polarity zones, preferably in a spiral configuration, arranged in
10 such a way as to produce magnetic fields which alternate radially as well as circumferentially. It can be clearly shown that no matter how blood vessels are situated under the present invention, then they must cross through alternating magnetic fields and therefore receive an optimal effect. Even though a blood vessel might cross near the periphery of the device, it still passes through several alternating magnetic fields and therefore experiences an optimal effect.
15 Furthermore, the average distance between poles remains relatively constant, whereas with the Baermann '532 device the distance which blood must travel before passing through alternating magnetic fields varies dramatically for those blood vessels not situated across the center of the device, thus minimizing its effectiveness.

In a further preferred embodiment, magnetic zones of north polarity and magnetic
20 zones of south polarity are positioned contiguous one another with at least one magnetic zone of north polarity being contiguous with four zones of south polarity and with at least one magnetic zone of south polarity being contiguous with four zones of north polarity.

Considering the differences in functionality and configuration between the proposed device and that of the prior art, the proposed device of the present invention is an improvement over the prior art that is substantial and not obvious.

In one embodiment, a flexible magnetic pad for therapeutic use is provided that has a generally planar flexible pad having an active surface including permanent magnetic particles embedded therein with said magnetic particles forming at least one magnetic zone of north polarity and at least three magnetic zones of south polarity. The magnetic zone of north polarity and the three magnetic zones of south polarity are positioned contiguous with one another with the magnetic zone of north polarity being contiguous with the three zones of south polarity to provide a basic configuration that is repeated across the flexible pad, wherein repetition of said basic configuration gives rise to a plurality of north and south magnetic zones, said plurality of magnetic zones of north polarity and said magnetic zones of south polarity alternating horizontally and vertically across the flexible pad.

In alternative embodiments of this configuration, the north magnetic zone can be in the shape of a triangle, right triangle, or an equilateral triangle. The magnetic zones of north polarity and said magnetic zones of south polarity can both be triangular in shape and/or all magnetic zones are each in the shape of triangles, right triangles, and/or equilateral triangles.

In another embodiment, a flexible magnetic pad for therapeutic use has a generally planar flexible pad having an active surface including permanent magnetic particles embedded therein with the magnetic particles forming at least one magnetic zone of south polarity and at least three magnetic zones of north polarity. The at least one magnetic zone of south polarity and the at least three magnetic zones of north polarity are positioned contiguous with one another and the at least one magnetic zone of south polarity is contiguous with the at least three

of the zones of north polarity to provide a basic configuration that is repeated across the flexible pad, wherein repetition of the basic configuration gives rise to a plurality of north and south magnetic zones, the magnetic zones of north polarity and the magnetic zones of south polarity alternating horizontally and vertically.

5 In alternative embodiments of this configuration, the south magnetic zone can be in the shape of a triangle, right triangle, or an equilateral triangle. The magnetic zones of south polarity and said magnetic zones of north polarity can both be triangular in shape and/or all magnetic zones are each in the shape of triangles, right triangles and/or equilateral triangles.

10 In another embodiment, a flexible magnetic pad for therapeutic use has a generally planar flexible pad having an active surface including permanent magnetic particles embedded therein with the magnetic particles forming at least one magnetic zone of north polarity and at least four magnetic zones of south polarity. The at least one magnetic zone of north polarity and the at least four magnetic zones of south polarity being positioned contiguous with one another and the at least one magnetic zone of north polarity is contiguous with the at least four
15 of the zones of south polarity to provide a basic configuration that is repeated across the flexible pad, wherein repetition of the basic configuration gives rise to a plurality of north and south magnetic zones, the magnetic zones of north polarity and the magnetic zones of south polarity alternating horizontally and vertically across the flexible pad.

20 In alternative embodiments of this configuration, the south magnetic zone can be in the shape of a rectangle, square, or other four-sided figure. The magnetic zones of south polarity and said magnetic zones of north polarity can both be rectangular, square, or other four-sided figure in shape and/or all magnetic zones are each in the shape of rectangles, squares, or other four-sided figures.

In another embodiment, a flexible magnetic pad for therapeutic use has a generally planar flexible pad having an active surface including permanent magnetic particles embedded therein with the magnetic particles forming at least one magnetic zone of south polarity and at least four magnetic zones of north polarity. The at least one magnetic zone of south polarity and the at least four magnetic zones of north polarity being positioned contiguous with one another and the at least one magnetic zone of south polarity is contiguous with the at least four of the zones of north polarity to provide a basic configuration that is repeated across the flexible pad, wherein repetition of the basic configuration gives rise to a plurality of south and north magnetic zones, the magnetic zones of south polarity and the magnetic zones of north polarity alternating horizontally and vertically across the flexible pad.

In alternative embodiments of this configuration, the north magnetic zone can be in the shape of a rectangle, square, or other four-sided figure. The magnetic zones of north polarity and said magnetic zones of south polarity can both be rectangular, square, or other four-sided figure in shape and/or all magnetic zones are each in the shape of rectangles, squares, or other four-sided figures.

In yet another embodiment, two basic configurations are combined to provide a surface-filling configuration of alternating magnetic polarities. In this embodiment, a flexible magnetic pad for therapeutic use has a generally planar flexible pad having an active surface including permanent magnetic particles embedded therein with the magnetic particles forming at least one first magnetic zone of north polarity and at least three second magnetic zones of south polarity. The at least one first magnetic zone of north polarity and the at least three second magnetic zones of south polarity are positioned contiguous with one another to provide a first basic configuration that is repeated across the flexible pad, wherein repetition of the first basic

configuration gives rise to a plurality of north and south magnetic zones, the plurality of magnetic zones of north polarity and the magnetic zones of south polarity alternating horizontally and vertically across the flexible pad. Additionally, the permanent magnetic particles embedded in the generally planar flexible pad have at least one third magnetic zone of south polarity and at least three fourth magnetic zones of north polarity. The at least one third magnetic zone of south polarity and the at least three fourth magnetic zones of north polarity are positioned contiguous with one another to provide a second basic configuration that is repeated across the flexible pad, wherein repetition of the second basic configuration gives rise to a plurality of north and south magnetic zones, the plurality of magnetic zones of north polarity and the magnetic zones of south polarity also alternating horizontally and vertically across the flexible pad. The first and second basic configurations are complementary to one another and are adjacent to one another to provide a larger third basic configuration that is repeated across the flexible pad to fill the active surface with zones of polarity.

OBJECTS OF THE INVENTION

Therefore, it is an object of the present invention to provide a therapeutic magnetic pad of constantly alternating polarity zones which is effective no matter where a blood vessel traverses the pad.

It is a further object to improve over the disadvantages of the prior art.

These and other objects and advantages of the present invention will be apparent from a review of the following specification and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a top plan view of the device.

Figure 2 is a top plan view of the device as in Figure 1, showing various positions of blood vessels traversing the device of the present invention.

5 Figure 3 is a top plan view of one embodiment of the prior art as noted in Latzke U.S. Patent No. 4,489,711.

Figure 4 is a top plan view of one embodiment of the prior art device as in Figure 3, showing various positions of blood vessels traversing the prior art device as in Figure 3 herein.

10 Figure 5 is a top plan view of another embodiment of a prior art device, as noted in Baermann U.S. Patent No. 4,459,532, in drawing Figures 1, 3 and 4 therein.

Figure 6 is a top plan view of another embodiment of the prior art as shown in Figure 5, showing various positions of blood vessels traversing the prior art device as in Figure 5 herein.

15 Figure 7 is a top plan view of another embodiment of the prior art, as noted in Baermann U.S. Patent No. 4,549,532, in drawing Figure 2 therein.

Figure 8 is a top plan view of the prior art embodiment as shown in Figure 7, showing various positions of blood vessels traversing the prior art device as in Figure 7 herein.

Figures 9-12 are top plan views of alternate embodiments of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

20 The detailed description set forth below in connection with the appended drawings is intended as a description of presently-preferred embodiments of the invention and is not intended to represent the only forms in which the present invention may be constructed and/or

utilized. The description sets forth the functions and the sequence of steps for constructing and operating the invention in connection with the illustrated embodiments. However, it is to be understood that the same or equivalent functions and sequences may be accomplished by different embodiments that are also intended to be encompassed within the spirit and scope of
5 the invention.

Referring to the drawings where like numerals of reference designate like elements throughout it will be noted that as shown in Figure 1, there is provided a flexible magnetic pad **10** having alternating north and south polarity zones denoted by reference numerals **12** and **14**. The alternating polarity zones **12** and **14** are arranged in preferably a spiral pattern emanating
10 from the center **16** of the device.

As such, no two polarity zones **12** and **14** are adjacent to any other polarity zones of the same polarity. For example, the north polarity zone **12** is always adjacent to south polarity zones **14**, **14a** and **14b**. Likewise, south polarity zone **14** is always adjacent to north polarity zones **12**, **12a** and **12b** throughout the spiral configuration as shown in Figure 1.

15 As shown in Figure 2, there are three possible orientations of blood vessels traversing the magnetic pad of the present device at three positions **20**, **22** and **24** representing the peripheral, off-center, and center crossing paths of the device respectively. Note that these positions can be at any angle, although only one angle is shown here for clarity. Blood vessels **20a**, **22a** and **24a** are shown as oriented along positions **20**, **22** and **24** respectively.

20 As noted in Figure 2, blood vessel **20a** at the periphery along path **20** will always traverse alternating north and south polarity zones, and therefore experiences an increase in blood flow. Furthermore, the same optimal exposure to alternate polarities occurs in blood vessel **22a** which traverses along position **22** and blood vessel **24a** which traverses along

position **24**. Note that although blood vessel **20a** crosses fewer alternating poles than do blood vessels **22a** and **24a**, it still crosses enough alternating poles to receive the desired effect.

As shown in Figure 3, the prior art device of the Latzke '711 patent is made up of linear pole strips of alternating polarities, oriented in one direction. In Figure 4, depicting the Latzke '711 prior art device, with various blood vessel orientations, blood vessel **30a** will have an optimal effect, whereas blood vessel **32a** will be less effective because it does not directly contact alternating polarities with the same effect as blood vessel **30a**. For example, while the blood vessel **32a** traverses the entire north polarity strip **36a**, it barely touches the edge of south polarity strip **38a**, therefore minimizing the effect of magnetic alternating poles upon the blood flow. Furthermore, as shown in Figure 4, the blood vessel **34a**, entirely traversing north polarity strip **36a**, will have absolutely no therapeutic effect, since the blood vessel is not subject to alternating polarity zones.

As shown in Figure 5, there is noted a device as similar to that in the Baermann '532 patent with concentric rings of alternating polarities. As shown in Figure 6, three blood vessels **40a**, **42a** and **44a** are oriented in the same fashion as the blood vessels shown in Figure 2. Blood vessel **40a** will receive an optimal effect since it crosses several alternating poles. Blood vessel **42a** will receive less of an effect since most of blood vessel **42a** crosses north polarity ring **47**, and little of south polarity ring **46** in relation to north polarity ring **47**. Furthermore, blood vessel **44a** will receive no therapeutic effect since it does not traverse any alternating polarity zones, but passes across only polarity ring **46** at the periphery of the device. An alternate view is shown in Figure 7 and Figure 8 for the specific embodiment as shown in Figure 2 of the Baermann '532 device. This device has a reverse effect to that shown in Figure 6 herein. As shown in Figure 8, blood vessels **50a**, **52a** and **54a** traverse at the

center, midway and the periphery of the device respectively. On the periphery, blood vessel 54a will be in contact with alternating polarities 56, 57 and 59 in a relatively uniform manner and therefore receive the desired effect. However, the blood vessel 52a traversing midway between the center and the periphery will have less effect since the poles vary in width beyond an acceptable range. Furthermore, when blood vessel 50a traverses the center of the pad, it will substantially cross only two pie-shaped sector poles 57 and 58 of the same polarity, therefore it will have no therapeutic effect.

As noted in Figure 9, the present invention may also be constructed in an alternate checkerboard pattern, wherein polarity zones of the same polarity are positioned in a staggered arrangement in the checkerboard pattern.

As illustrated in Figure 9, magnetic zones of north polarity and magnetic zones of south polarity are position contiguous one another with each magnetic zone of north polarity being contiguous with four zones of south polarity, and with each magnetic zone of south polarity being contiguous with four zones of north polarity (except for those magnetic zones positioned along the perimeter of the flexible pad).

Figures 10, 11 and 12 illustrate an embodiment of the present invention wherein magnetic zones of north polarity are contiguous with three zones of south polarity and vice versa, and triangular in shape, either right triangles or equilateral triangles.

In contrast to the prior art devices as shown in Figures 3 through 8 herein, the present invention as shown in Figures 1, 2 and 9-12 herein maximizes the therapeutic effects on blood vessels by increasing the blood flow, by virtue of the exposure of the blood vessels to constantly alternating polarity zones throughout the various configurations of the present invention.

It is to be noted that other variations and modifications may be made to the present invention without departing from the spirit and scope thereof, as noted in the appended claims. While the present invention has been described with regards to particular embodiments, it is recognized that additional variations of the present invention may be devised without departing
5 from the inventive concept.